

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	10/620,654	:	Confirmation No.:	1421
Applicant	:	Rabasco et al.			
Filed	:	July 16, 2003			
For	:	Polymer Emulsion Coatings For Cellulosic Substrates With Improved Barrier Properties			
Art Unit	:	1773			
Examiner	:	Tarazano, Donald Lawrence.			
Docket No.	:	06326 USA			
Customer No.	:	23543			

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF ON APPEAL UNDER 37 CFR 41.37

This appeal is from the Final Rejection of October 13, 2006.

REAL PARTY IN INTEREST

Air Products Polymers, L.P. is the real party in interest in the appeal. The assignment has been recorded at Reel 014, 311, Frame 0620.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF CLAIMS

Claims 1-18 are pending in the application and are the subject of this appeal.

STATUS OF AMENDMENTS

No amendments have been filed subsequent to the Final Rejection of October 13, 2006.

SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1: In a cellulosic product in contact with a material containing moisture, an oil, grease, solvent or fat, comprised of a cellulosic substrate having a polymer coating applied thereto which imparts a barrier against said moisture, oil, grease, solvent or fat contained in said material, page 3, [0011], when in contact therewith, page, 20, [0051] and page 21, [0053], the improvement which comprises:

said polymer coating comprised of an ethylene-vinyl acetate polymer emulsion comprised of crystalline ethylene segments prepared by aqueous emulsion polymerization of ethylene and vinyl acetate, page 5, [0017], line11, [0019], lines 19-21, in the presence of a stabilizing system consisting essentially of a surfactant or a protective colloid in combination with a surfactant, page 7, [0026], lines 13-18, said ethylene-vinyl acetate polymer having:

- (a) a crystalline melting point ranging from 35 to 110 °C measured at a heat rate of 20 °C per minute, page 3, [0011], lines 16-17; and,
- (b) a tensile storage modulus of at least 1×10^5 dynes/cm² at a temperature of 115 °C and measured at 6.28 rad/sec, page 3, [0011], lines 18-19.

Claim 14: In a paper or paperboard product in contact with a food product, page 20, [0051], and page 21, [0053], and comprised of a paper or paperboard substrate having a polymer coating applied thereto which imparts a barrier to moisture, oil or fat contained in food product (page 3, [0011], lines 11-12), the improvement which comprises:

said polymer coating consisting essentially of ethylene, vinyl acetate, and carboxylic acid or N-methylol acrylamide, said polymer prepared by aqueous emulsion polymerization of ethylene, vinyl acetate and carboxylic acid or N-methylol acrylamide in the presence of a stabilizing system consisting essentially of a surfactant or a protective colloid in combination with a surfactant, page 14, [0042], and page 18, [0048], said ethylene-vinyl acetate polymer having:

- (a) a crystalline melting point ranging from 50 to 90 °C measured at a heat rate of 20 °C per minute, page 5, [0019], lines 19-21; and,
- (b) a tensile storage modulus of at least 1×10^5 dynes/cm² at a temperature of 115 °C and measured at 6.28 rad/sec, page 5, [0020], lines 26-28.

GROUND'S OF REJECTION TO BE REVIEWED ON APPEAL

Ground 1. Whether the subject matter of Claims 1-4, 6-11 and 13 are anticipated by Daniels et al., US 5,872,181 ('181), under 35 U.S.C. §102(b).

Ground 2. Whether the subject matter of Claims 1-18 would have been obvious to one skilled in the art under 35 U.S.C. §103(a) over Daniels et al., US 5,872,181 ('181), Daniels et al., US 6,316,978 ('978), or Worrall, US 3,355,322 ('322), alone, or in combination.

ARGUMENT

Rejection Under 35 U.S.C. §102(b)

The position of the Examiner is set forth at page 3 of the Office Action, the gist of which is that Fig. 1 of Daniels et al. ('181) discloses commercial and working examples of polymers having a storage modulus greater than 1×10^5 dynes/cm² and Example 6 discloses polymers having similar levels of vinyl acetate, ethylene, and acrylic acid to Applicants' polymers. The Examiner submitted there was clear reason to believe the claimed heats of fusion and melting points were inherent in the materials taught in '181 because the Applicants claim a broad range and the comonomers and amounts and the process conditions were close to those of Applicants. In addition, N-methylolacrylamide was disclosed in '181 as a comonomer.

Applicants' Response to the Rejection of

Claims 1-4, 6-11 and 13 Under 35 U.S.C. §102(b)

As a first point in the analysis under 35 U.S.C. §102(b), it should be noted that Applicants have claimed a cellulosic substrate in contact with a material containing moisture, an oil, fat, grease or solvent (preamble Claim 1) having a barrier coating applied thereto which is resistant to moisture, an oil, fat, grease or solvent. By the language of Claim 1, it is the barrier coating which is in contact with a material containing moisture, an oil, fat, grease or solvent, such as may be present in a food product (Claim 14). On the other hand, Daniels et al. ('181), in the test description at col. 9, line 10 to col. 10, line 4, apply a vinyl acetate/ethylene polymer emulsion to a polymeric film, i.e., PET and Mylar, and laminate it to a cellulosic substrate. In that method, the vinyl acetate/ethylene polymer of Daniels et al. is placed as an interlayer between the cloth and the polymeric film. In fact, Daniels et al. only show the use of the polymer as an adhesive interlayer for binding two substrates. There is

no barrier coat on the exterior surface of the cloth should it come in contact with a material containing moisture, an oil, fat, grease or solvent (Claim 1) or in contact with food (Claim 14). Therefore, it follows that the teachings in Daniels et al. ('181) do not meet the terms of the preamble of Applicants' Claims 1-4, 6-11 and 13, and by this fact alone the reference does not make a case of anticipation under 35 U.S.C. §102(b).

More to the point, and going to the heart of the issue of anticipation, it has been argued by Applicants that the vinyl acetate/ethylene polymers disclosed in Daniels et al. ('181) are significantly different in terms of their physical properties, particularly their thermal properties, than those disclosed and defined by Applicants as the improved barrier coating in independent Claims 1 and 14. It has been argued by Applicants that even though the polymers of Daniels et al. ('181) appear compositionally similar to those claimed, and some have a tensile storage modulus of greater than 1×10^5 dynes/cm², they have substantially different thermal properties due to the fact there is no ethylene crystallinity in the polymers as measured by the thermal melting point. With respect to dependant Claims 9 and 16, the polymers disclosed in '181 do not have a heat of fusion within the claimed range.

With respect to anticipation based upon the composition of the vinyl acetate/ethylene polymer employed as the barrier coat, the Examiner offered the following comment at page 3, paragraph 4, of the final office action, regarding Applicants polymers:

"...there is clear reason to believe that the property would be inherent in the materials taught. ..."

Applicants submit that the statement is not supportable given the evidence before the Examiner. For example, (1) Applicants' specification pages 5-7, [0017] - [0024], provides substantial teaching as to the variables in achieving ethylene crystallinity in the resulting polymer; and (2) the Daniels et al. ('181) reference show that polymers having similar composition in terms of vinyl acetate and ethylene concentrations and produced under somewhat similar conditions can have highly different physical properties. Even though some of the respective polymers may have a tensile storage modulus of greater than 1×10^5 dynes/cm², the physical properties of the polymers are quite different. The vinyl acetate/ethylene polymers of Daniels et al. ('181) are laminating adhesives which do not

exhibit "dry tack.". Thus, the reference cited by the Examiner also rebuts the logic of the Examiner's above statement with respect to inherency.

To address the arguments, and also to rebut the position of the Examiner regarding anticipation, as well as augment the arguments of nonobviousness of the subject matter claimed here, Applicants supplied substantial evidence to the effect that the vinyl acetate/ethylene polymers of the prior art and the commercial vinyl acetate/ethylene polymers of the prior art disclosed in Daniels et al., '181 and '978, do not have crystalline ethylene segments having a melting point within the Applicants' claimed range. More specifically, a declaration (signed 6 Feb. 2006) Mr. Daniels, coinventor of Daniels et al. ('181 and '978), indicated in several paragraphs that the vinyl acetate/ethylene polymers did not have ethylene crystallinity. In a declaration (signed 7 Feb. 2006) by Dr. Rabasco it was pointed out that the vinyl acetate/ethylene polymers of Worrall ('322) did not possess ethylene crystallinity within the claimed melting point range.

In the Office Action of May 2, 2006, the declaration of February 14, 2006 by Mr. Daniels was deemed non-persuasive. At page 8 of the October 31, 2006 Office Action, paragraphs 9 and 10 of the declaration were deemed limited in scope to only claimed polymers and not all. This was based upon, Mr. Daniels stating in the declaration:

"...none of the claimed vinyl acetate/ethylene polymers were deemed to have ethylene crystallinity...".

Applicants believe the Examiner has given the declaration a very narrow and restrictive reading. It appears that no credit was given to summarizing paragraphs 11 and 12 in the declaration. If there had been any ambiguity in paragraphs 9 and 10 as to the scope of the polymers disclosed and compared in Daniels et al. ('181), that certainly was clarified in subsequent paragraphs 9 and 10 wherein it was recited that none of the commercial vinyl acetate/ethylene polymers and all polymers in Daniels et al. ('181 and '978) had substantially different thermal properties than employed here as the barrier coat.

Nonetheless, to facilitate prosecution, Applicants, in a response to the Office Action of May 2, 2006, filed a supplemental declaration by Mr. Daniels in an effort to remove any perceived ambiguity in the prior declaration. The declaration signed July 31, 2006 provided statements to the effect that none of the vinyl acetate/ethylene polymers in Daniels et al. '181

and '978, including commercial polymers, disclosed in either reference were observed (emphasis added) to have ethylene crystallinity having a melting point of 35 to 110 °C (paragraph 9 of the declaration).

In the Office Action of October 13, 2006, finally rejecting all claims, beginning at page 8, the Examiner objected to the declaration signed July 31, 2006, on the basis that Mr. Daniels used the term "observed" and wished clarification. The Examiner consulted dictionary definitions and construed the term "observed" as not "positively affirmed", i.e., that all polymers in ('181 and '978) did not have a crystalline melting point within the claimed range.

Applicants believe there is no credible basis with respect to the narrow interpretation of the declaration of Mr. Daniels dated February 6, 2006 and certainly no credible basis for the Examiner's interpretation of the July 31, 2006 declaration with reference to the term "observed". The Examiner acknowledged dictionary definitions of the term "observed" included a "systematic or scientific observation" and "...[t]o watch or be present without taking active part...", the thought being those two definitions might cause confusion. It is submitted that one is dealing with a "scientific observation" here as to whether the polymers disclosed in Daniels et al. ('181 and '978) did or did not have crystalline ethylene segments within the melting point temperature range claimed. In order to determine whether crystalline ethylene segments exist, DSC scans are generated and one must observe the scans to note the existence or non existence of "crystalline ethylene segments". (The Honorable Board is invited to see the scans in the declaration of Dr. Rabasco attached hereto.) Mr. Daniels was quite capable of interpreting scans and from his observation noted that the polymers in Daniels et al. ('181 and '978) did not have ethylene crystallinity within the claimed range. It also is submitted, it is irrelevant as to whether Mr. Daniels did or did not take an active part in generating the scans but only that he observe the scans, per the definition of "observed".

Summarizing, there can be no anticipation of Claims 1-4, 6-11 and 13 based upon Daniels et al. ('181) because: (a) the vinyl acetate/ethylene polymers in Daniels et al. ('181) are laminated to a polymeric film and such vinyl acetate/ethylene polymers would not be in actual contact with materials containing moisture, an oil, fat, grease or solvent, as recited in Applicants' independent Claims 1 and 14; (b) none of the vinyl acetate/ethylene polymers

disclosed in Daniels et al. ('181) have ethylene crystallinity within a temperature range of 35-110 °C as amply noted in the declarations of Mr. Daniels; and (c) there was no *prima facie* or technical basis for believing Applicants' polymers would have identical thermal properties to those in Daniels et al. ('181) given the evidence in Applicants' specification and the teachings in the cited references.

Obviousness Rejection Of Claims 1-18 Under 35 U.S.C. §103(a) in View of Daniels et al. ('181), Daniels et al. ('978), or both '181 and '978 together with Worrall ('322)

At page 4 of the final office action (dated 10/13/2006), the Examiner cited Daniels et al. ('181) as disclosing that additional monomers, e.g., N-methylolacrylamide may be included in their polymers, and that similar amounts of ethylene were disclosed. The Examiner also pointed to the fact that applicants had admitted that pressure sensitive adhesives had applied to paper stock.

At paragraph 11 of the Office Action Daniels et al. '978 was cited as disclosing the application of pressure sensitive adhesives to paper and it would have been obvious to use commercial products taught by Daniels et al. to coat paper and make an adhesive structure.

At Paragraph 15, Worrall was cited as teaching the use of vinyl acetate/ethylene copolymers to coat cellulose.

Applicants' Response to Obviousness Rejection Of Claims 1-18

It is submitted that the above references, cited by the Examiner, alone or in combination do not establish obviousness to one skilled in the art to sustain a rejection under 35 U.S.C. §103(a). It is submitted the references do not even establish a *prima facie* case of obviousness and, if so, that *prima facie* case has been rebutted.

Applicants independent Claims 1 and 14 are directed to an improvement in cellulosic substrates, e.g., paper stock (Claim 14), having a barrier coating applied thereto which provides resistance to moisture, an oil, fat, grease or solvent, when incontact therewith. These products are often used in the packaging of microwavable food products and the barrier coat is provided to prevent penetration of the oils, etc., to the substrate. This feature is a part of Claims 1 and 14 and it is well illustrated at page 1 and again in Example 9, pages

20-23 of Applicants' specification. As Claims 1 and 14 are written, the materials containing moisture, an oil, fat, grease or solvent, are in contact with the barrier coat, and in this case, it is Applicants' vinyl acetate/ethylene polymers having the properties identified, i.e., a tensile storage modulus and a thermal melting point for crystalline ethylene segments, that are in contact with the material and function as the barrier coat.

In a review Daniels et al. ('181) it will be noted a laminating adhesive comprised of a vinyl acetate/ethylene polymer is used to adhere cloth to polymeric films wherein the adhesive is placed as an interlayer between the cloth and polymeric film. The vinyl acetate/ethylene polymers of Daniels et al. ('181) are designed to adhere to hard substrates, e.g., polyethylene and metallized films, e.g., Mylar, which laminates are used in food packaging. As disclosed, the adhesive is applied to a polymer film and a cloth applied over the adhesive (col., 9, lines 15-30). In Daniels et al. ('181), then, the uncoated surface of the polymeric film laminated to the cloth, or the uncoated surface of the cloth, which, if used in food packaging which would be in contact with the food products, not the adhesive. There is no suggestion in '181 that the vinyl acetate/ethylene polymer is used as a barrier coat, only a laminating adhesive, and not as a barrier coat suited for contact with materials containing oils, fats, etc.

The Examiner points to the fact that Daniels et al. ('181) disclose that pressure sensitive adhesives had been used in forming and bonding paper products, etc., for food application. While that may be true, that disclosure offers nothing of substance to an analysis of Applicants' claimed subject matter under 35 U.S.C. §103(a). Pressure sensitive adhesives as disclosed by Daniels et al. are used in laminate formation not as a barrier coat. Similar to Daniels et al., it is the exterior surface of the polymeric film laminate which acts as a barrier to oils, etc. when in contact with a food product not the pressure sensitive adhesive. And further, Applicants' polymers as claimed are non blocking, i.e., they are not pressure sensitive (See Table, Example 9.)

Daniels et al. ('978) disclose water-based pressure sensitive adhesives designed for laminating films and paper labels (col. 1, lines 12-15). To suggest it would have been obvious to one skilled in the art to coat a paper product with a water-based pressure sensitive adhesive and use the pressure sensitive adhesive as a barrier coat to moisture, an

oil, fat, grease or solvent, found in food and other products, as the Examiner has done, is highly questionable. Any substance placed in contact with the Daniels et al. ('978) vinyl acetate/ethylene pressure sensitive adhesive would stick. Food products would stick, as for example the type of food products described at Applicants' specification, page 20, [0051], to the substrate.

Worrall was cited as teaching the application of vinyl acetate/ethylene adhesives for paper application. Worrall discloses vinyl acetate/ethylene adhesives which result in bonding under pressure. The polymers of Worrall, as with the polymers of '181 or '978, as reported in the declarations of Christian Daniels and John Rabasco, do not have ethylene crystallinity and therefore no thermal melting point. In addition, they do not have a heat of fusion as set forth in many dependant claims. Combining the references as indicated in the rejection would not result in the polymers of the claimed invention. Accordingly, a rejection of Claims 1-18 under 35 U.S.C. §103(a) based upon a combination of these references is not warranted.

Lastly, in the analysis of whether the subject matter of the invention as claimed would have been obvious under 35 U.S.C. §103(a), Applicants tested representative vinyl acetate/ethylene polymers having the tensile storage modulus and ethylene crystallinity having the defined range of melting points against vinyl acetate/ethylene polymers not having the combination of defined properties, i.e., polymers representative of Daniels et al. ('181). As pointed out at page 23, [0061-0064], of Applicants' specification, the prior art vinyl acetate/ethylene polymers which did not have the combination of properties, and particularly the thermal properties, i.e., ethylene crystallinity within the melting point range, did not perform as well as the claimed vinyl acetate/ethylene polymers over the broad range of tests employed (Example 9). The test results clearly show the nonobviousness of the claimed invention and rebut any *prima facie* case of obviousness, if made.

Summarizing, it is submitted the invention set forth in Claims 1-18 would not have been obvious to one skilled in the art 35 U.S.C. §103 (a) because: (a) none of the references teach application of vinyl acetate/ethylene polymers to a cellulosic substrate, e.g., paperboard, for purposes of effecting a barrier to the substrate where the barrier coat is in contact with a material containing an oily or fat products such as present in foods, and (b)

none of the references disclose vinyl acetate/ethylene polymers having the combination of physical properties claimed by Applicants, i.e., tensile storage modulus and ethylene crystalline segments or domains having a melting point within a range of 35 to 110 °C. One knowing the thermal properties of the polymers of Daniels et al. '181 would not use such polymers as a barrier coat for products exposed to elevated temperatures,.

Conclusion

In view of the foregoing it is requested of the Board of Appeals and Patent Interferences that the Examiner be reversed with respect to the rejection of Claims 1-4, 6-11 and 13 under 35 U.S.C. §102(b) based upon Daniels et al. ('181) and reversed with respect to the rejection of Claims 1-18 under 35 U.S.C. §103(a) based upon Daniels et al. ('181), Daniels et al. ('978) and Worrall ('322), alone, or in combination.

Respectfully submitted,

/Mary E. Bongiorno/

Mary E. Bongiorno
Agent for Applicants
Registration No. 36,091

7201 Hamilton Boulevard
Allentown, PA 18195-1501
(610) 481-8820

CLAIMS APPENDIX

1. In a cellulosic product in contact with a material containing moisture, an oil, grease, solvent or fat comprised of a cellulosic substrate having a polymer coating applied thereto which imparts a barrier against said moisture, oil, grease, solvent or fat contained in said material when in contact therewith, the improvement which comprises:

said polymer coating comprised of an ethylene-vinyl acetate polymer emulsion comprised of crystalline ethylene segments prepared by aqueous emulsion polymerization of ethylene and vinyl acetate in the presence of a stabilizing system consisting essentially of a surfactant or a protective colloid in combination with a surfactant, said ethylene-vinyl acetate polymer having:

(a) a crystalline melting point ranging from 35 to 110 °C measured at a heat rate of 20 °C per minute; and,

(b) a tensile storage modulus of at least 1×10^5 dynes/cm² at a temperature of 115 °C and measured at 6.28 rad/sec.

2. The cellulosic product of claim 1 wherein the polymer is comprised of from 15 to 90% by weight of polymerized units of vinyl acetate and from about 10 to 85% by weight of polymerized units of ethylene based upon the total weight of the polymer.

3. The cellulosic product of claim 2 wherein the polymer is comprised of from 25 to 80% by weight of polymerized units of vinyl acetate and from about 20 to 75% by weight of polymerized units of ethylene based upon the total weight of the polymer.

4. The cellulosic product of claim 2 wherein the polymer is comprised of from 35 to 75% by weight of polymerized units of vinyl acetate and from about 25 to 65% by weight of polymerized units of ethylene based upon the total weight of the polymer.

5. The cellulosic product of claim 4 wherein the polymer is comprised of from 30 to 50% by weight of polymerized units of vinyl acetate and from about 50 to 70% by weight of polymerized units of ethylene based upon the total weight of the polymer

6. The cellulosic product of claim 2 wherein polymerized carboxylic acid or N-methylol acrylamide units are present in said polymer in an amount from about 0.2 to about 10% by weight of said polymer.

7. The cellulosic product of claim 3 wherein said polymer has a tensile storage modulus of at least 2×10^5 dynes/cm² at 115 °C measured at 6.28 rad/sec.

8. The cellulosic product of claim 7 wherein the polymer consists essentially of polymerized units of ethylene, vinyl acetate, and carboxylic acid.

9. The cellulosic product of claim 8 wherein the crystalline heat of fusion of said polymer is from about 5 to 100 joules per gram as measured at a heat rate of 20 °C per minute.

10. The cellulosic product of claim 9 wherein the glass transition temperature is from +25 °C to about -40 °C as measured at a heat rate of 20 °C per minute.

11. The cellulosic product of claim 10 wherein crystalline thermal melting point ranges from 50 to 90 °C as measured at a heat rate of 20 °C per minute.

12. The cellulosic product of claim 8 wherein the Tg of the polymer is from -25 to -35 °C.

13. The cellulosic product of claim 12 wherein the crystalline heat of fusion ranges from preferably 15 to 70 joules per gram as measured at a heat rate of 20 °C per minute.

14. In a paper or paperboard product in contact with a food product and comprised of a paper or paperboard substrate having a polymer coating applied thereto which imparts a barrier to moisture, oil or fat contained in food product, the improvement which comprises:

said polymer coating consisting essentially of ethylene, vinyl acetate, and carboxylic acid or N-methylol acrylamide, said polymer prepared by aqueous emulsion polymerization of ethylene, vinyl acetate and carboxylic acid or N-methylol acrylamide in the presence of a

stabilizing system consisting essentially of a surfactant or a protective colloid in combination with a surfactant, said ethylene-vinyl acetate polymer having:

- (a) a crystalline melting point ranging from 50 to 90 °C measured at a heat rate of 20 °C per minute; and,
- (b) a tensile storage modulus of at least 1×10^5 dynes/cm² at a temperature of 115 °C and measured at 6.28 rad/sec.

15. The paper or paperboard product of Claim 14 wherein the T_g of the polymer ranges from -25 to -35 °C.

16. The paper or paperboard product of claim 15 wherein the heat of fusion of said polymer is from 10 to 70 joules per gram as measured at a heat rate of 20 °C per minute.

17. The paper or paperboard product of claim 16 wherein the ethylene is present in an amount from 35 to 75 weight percent vinyl acetate, 25 to 65 weight percent ethylene, and from 0.2 to 10 percent by weight carboxylic acid or N-methylol acrylamide.

18. The paper or paperboard product of claim 16 wherein the polymer consists essentially of ethylene, vinyl acetate, and carboxylic acid.

10,624,654

EVIDENCE APPENDIX

1. Declaration of Mr. Daniels signed February 6, 2006.
2. Declaration of Dr. Rabasco signed February 8, 2006.
3. Declaration of Mr. Daniels signed July 31, 2006.

10,624,654

RELATED PROCEEDINGS APPENDIX

None

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	Signature of person mailing paper

Sir:

DECLARATION UNDER 37 CFR 1.132

Mr. Christian L. Daniels, the declarant hereby states the following:

1. that he has a Masters in the field of Polymer Science;
2. that he is employed by the assignee in the above application, i.e., Air Products Polymers, L.P. as a research chemist;
3. that his field of endeavor within the Product Research Group of Air Products Polymers, L.P. resides, *inter alia*, in the development of polymer emulsions for use as pressure sensitive adhesives, laminating adhesives, nonwoven binders, coatings, caulks, grouts, etc.;

4. that as Research Associate he has considerable experience in the design and development of vinyl acetate based emulsions, including vinyl acetate/ethylene emulsions, for the above recited applications;
5. that he is familiar with the subject matter described in the above-identified application and has actual knowledge of the physical properties of the vinyl acetate/ethylene polymers described in the above-identified application used as barrier coatings for cellulose and paper substrates;
6. that he has reviewed the Office Action of October 31, 2005 including more specifically the rejection of Claims 1-18 based upon the references Daniels, et al US 5,872,181 and Daniels, et al US 6,319,978;
7. that he has reviewed the amendment filed with the request for continued examination and the amendments to the claims which call for the use of cellulosic colloid stabilized vinyl acetate/ethylene polymers having the claimed properties as barrier coatings for moisture, oils, fats, and the like when applied to cellulosic and paper products;
8. that he understands from a reading of the Office Action that the Examiner has taken the position that there was clear reason to believe the polymers described in these Daniels, et al references would have thermal melting points of from 35 to 110 °C and heats of fusion within the range claimed in the above-identified application;
9. that as a coinventor in the Daniels, et al '181 reference and the '978 reference, he states that with regard to the polymers described in the Daniels, et al '181 and '978 references, none of the claimed vinyl acetate/ethylene polymers were observed to have ethylene crystallinity having a melting point of from 35 to 110 °C;
10. that the polymers described in '181 are laminating adhesives and typically stabilized with polyvinyl alcohol and these polymers do not have ethylene crystallinity having a melting point of from 35 to 110 °C;

11. that none of the commercial vinyl acetate/ethylene polymers described in the Daniels, et al '181 reference have ethylene crystallinity having a melting point of from 35 to 110 °C;
12. that the thermal properties of all vinyl acetate/ethylene polymers in Daniels, et al '181 and '978 are substantially different from those having ethylene crystallinity and a thermal melting point of from 35 to 110 °C as set forth in the claims in the above-identified application, even though some of the polymers in Daniels, et al '181 and '978 may have a tensile storage modulus within the range claimed; and,
13. that because the thermal properties of the respective polymers are different they find use in differing applications;

That all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.



Christian L. Daniels

Title: Research Associate

Date: 6 February 2006

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	(Type or print name of person mailing paper)
	<u>Mary E. Bongiorno</u>
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Sir:

DECLARATION UNDER 37 CFR 1.132

Dr. Christian L. Daniels, the declarant hereby states the following:

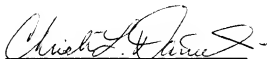
1. that he has a Masters Degree in the field of Polymer Science;
2. that he is employed by the assignee in the above application, i.e., Air Products Polymers, L.P. as a research chemist;
3. that his field of endeavor within the Product Research Group of Air Products Polymers, L.P. resides, *inter alia*, in the development of polymer emulsions for use as pressure sensitive adhesives, laminating adhesives, nonwoven binders, coatings, caulks, grouts, etc.;

4. that as Research Associate he has considerable experience in the design and development of vinyl acetate based emulsions, including vinyl acetate/ethylene emulsions, for the above recited applications;
5. that he is familiar with the subject matter described in the above-identified application and has actual knowledge of the physical properties of the vinyl acetate/ethylene polymers described in the above-identified application used as barrier coatings for cellulose and paper substrates;
6. that he has reviewed the Office Action of October 31, 2005 and May 2, 2006 including more specifically the rejection of Claims 1-18 either in part or in combination based upon the Daniels, et al US 5,872,181 and Daniels, et al US 6,319,978;
7. that he understands from a reading of the Office Action, and the response to be filed, that the Examiner has taken the position that there was clear reason to believe the polymers described in the two Daniels, et al references which have a storage modulus of at least 1×10^5 would have thermal melting points of from 35 to 110 °C and heats of fusion and within the range claimed in the above-identified application;
8. that he also understands that there was perceived ambiguity in his prior declaration in that the Examiner did not interpret the declaration to include the working examples having a storage modulus of at least 1×10^5 and to the commercial examples having a storage modulus of at least 1×10^5 when indicating that those polymers did not have ethylene crystallinity having a melting point of from 35 to 110 °C;
9. that as a coinventor in the Daniels, et al '181 reference and the '978 reference, he now states that with regard to all polymers described in the Daniels, et al '181 and '978 references, none of the vinyl acetate/ethylene polymers described in the working examples and none of the vinyl acetate/ethylene polymers described in the comparative examples, including the commercial vinyl acetate/ethylene polymers described in '181

and '978 patents, were observed to have ethylene crystallinity having a melting point of from 35 to 110 °C; and,

10. that as stated in the February 14, 2006 declaration the thermal properties of all vinyl acetate/ethylene polymers in Daniels, et al '181 and '978 are substantially different from those in the above captioned application having a storage modulus of at least 1×10^5 at a temperature of 115 °C and ethylene crystallinity having a thermal melting point of from 35 to 110 °C even though some of the polymers in Daniels, et al '181 and '978 may have a tensile storage modulus within the range claimed.

That all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.



Christian L. Daniels

Title: Research Associate

Date: 31 July 2006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/620,654 : Confirmation No.: 1421
Applicant : Rabasco, et al
Filed : July 16, 2003
For : Polymer Emulsion Coatings For Cellulosic Substrates
With Improved Barrier Properties

Art Unit : 1773
Examiner : Tarazano, Donald Lawrence.
Docket No. : 06326 USA
Customer No. : 23543

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF MAILING	
I CERTIFY THAT THIS PAPER (ALONG WITH ANY PAPER REFERRED TO AS BEING ATTACHED OR ENCLOSED) IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE WITH SUFFICIENT POSTAGE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO:	
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Signature of person mailing paper	

DECLARATION UNDER 37 CFR 1.132

Dr. John J. Rabasco

The declarant hereby states the following:

1. that he has a Doctorate in the field of Chemistry;
2. that he is employed by the assignee in the above application, i.e., Air Products Polymers, L.P. as a research chemist;
3. that his field of endeavor within the Product Research Group of Air Products Polymers, L.P. resides, *inter alia*, in the development of polymer emulsions for use as pressure sensitive adhesives, laminating adhesives, nonwoven binders, coatings, caulks, grouts, etc.;

4. that as Senior Principal Research Chemist he has considerable experience in the design and development of vinyl acetate based emulsions, including vinyl acetate/ethylene emulsions, for the above recited applications;
5. that he has reviewed the Office Action of October 31, 2005 including more specifically the rejection of Claims 1-18 based upon Worrall, et al US 3,355,322;
6. that at his direction two experimental attempts to reproduce the polymer emulsions of Example #1, Composition B of Worrall US 3,355,322, et al were made and these attempts are identified as Examples 1 and 2 in this declaration;
7. that the experimental attempts were carried out in following equipment and under the following conditions:
 - a) a one-gallon, stainless steel, stirred tank reactor was used instead of a rockable stainless steel reactor;
 - b) the agitation speed was set at 600 rpm;
 - c) the scale was increased by a factor of four to match the reactor fillage as laid out in Example 1 of Worrall, et al;
 - d) Natrosol® 250LR was used as the hydroxyethyl cellulose, which is the specified protective colloid for Composition B;
 - e) Disponil® A3065 was used as the polyoxyethylene lauryl ether;
 - f) the vinyl acetate and ethylene were charged to the reactor in the weight ratio specified for Composition B, i.e., 58/42 vinyl acetate/ethylene for the initial charge and 68/32 for the vinyl acetate/ethylene feeds during polymerization; and,
 - g) separate feed lines were used to charge the vinyl acetate and ethylene instead of charging as a mixture as specified in Example 1 (the

equipment set up did not allow for charging vinyl acetate and ethylene as a mixture);

Example 1

- a) that the reactor was charged with deionized water (958.25 grams), Disponil A3065 (14.15 grams as a 65 wt% active solution of a polyoxyethylene lauryl ether), sodium hydrogen phosphate (12.0 grams), Natrosol 250LR (960 grams, as a 2 wt% active solution of hydroxyethyl cellulose), and potassium persulfate (9.2 grams).
- b) that the above amount of reactants and agents charged to the reactor resulted in an increase over the amounts employed by Worrall, et al by of a factor of four;
- c) that in order to maximize the extent of activity of the thermal initiator, potassium persulfate, and maximize conversion of vinyl acetate and ethylene during the polymerization, the initial monomers were charged to the reactor prior to heating the reaction mixture. (Although Worrall, et al specify heating the above mixture to 70 °C prior to charging the monomers, it was believed better to charge the monomers to the reactor first because potassium persulfate as a thermal initiator begins to degrade and generate radicals when heated to 70 °C. Secondly, Worrall, et al did not specify how long would take to heat the mixture to 70 °C nor did Worrall specify how long the mixture was to be held at 70 °C before charging the monomers. Thirdly, Worrall, et al did not specify how long it took to complete the initial charge of vinyl acetate and ethylene. There is

no disclosure in Worrall, et al that these time periods are critical. Thermally active initiators such as potassium persulfate would have been at least partially degraded by the time the monomers were charged, thus having significant impact on how the polymerization proceeds, i.e., the rate of polymerization);

- d) that 621 grams of vinyl acetate and 450 grams of ethylene were charged to the reactor, followed by heating this entire mixture to 70 °C. This amount of vinyl acetate and ethylene was calculated (at a 58/42 ratio) so as to achieve a reactor pressure of 1800 psig at 70 °C;
- e) that it was found that at 70 °C, the pressure was 2600 psig instead of the specified 1800 psig but within the overall allowed pressure range permitted by Worrall, et al. However, because the reaction was proceeding and the pressure was declining, there was no 1.5h induction period as noted by Worrall, et al. (Worrall, et al provide no disclosure indicating that an induction period is critical.);
- f) that when the pressure declined to 1800 psig the vinyl acetate and ethylene monomers feeds were charged into the reactor at the specified ratio and at a rate to maintain 1800 psig;
- g) that based upon calculations (assuming 100% conversion) sufficient vinyl acetate and ethylene was added to the reactor to provide a final product solids content of 45 weight percent;
- h) that the addition of this calculated amount of vinyl acetate and ethylene was completed within 3 hours (Worrall, et al added the feeds over 6 hours and that may have been due to a lower reaction rate due to the unknown time at which the potassium persulfate was exposed to elevated

temperatures prior to charging the monomers. Again there is no disclosure that introducing a delay feed over 6 hours is critical to producing the product except for the maintaining of reaction rate as opposed to the 3 hour introduction period employed here to maintain reaction rate);

- i) that the final product had a solids content of 39.6 weight percent, 3.6 weight percent unreacted vinyl acetate, and the final product had high levels of grit and coagulum;
- j) that analysis of the final product with differential scanning calorimetry (DSC) showed that the polymer had a glass transition temperature of -25.3°C and no ethylene crystallinity. There was no melting point transition and no heat of fusion evident for the entire DSC scan which ranged from -65°C to $+200^{\circ}\text{C}$ indicating the absence of crystallinity in the polymer. (A copy of the scan is attached hereto and it is appropriately identified); and,
- k) that the polymer when cast as a film had a tacky surface at room temperature.

Example 2

- a) that the procedure of Example 1 was repeated, with the general exception to the procedure for charging the initial amounts of vinyl acetate and ethylene;
- b) that 372.6 grams of vinyl acetate and 270 grams of ethylene were charged to the reactor, followed by heating the mixture to 70°C . Once at


70 °C, additional vinyl acetate and ethylene was added at the 58/42 ratio until a pressure of 1800 psig was reached;

- c) that once at 1800 psig, it was evident again reaction was taking place, and therefore, there was no induction period. Therefore, the vinyl acetate/ethylene monomer delay feeds were started immediately, as in Example 1 described above;
- d) that calculated amounts of vinyl acetate and ethylene were added to the reactor in a 3 hour time period instead of a 6 hour time period;
- e) that the final product had a solids content of 40.4 weight percent, 5.2 weight percent unreacted vinyl acetate, and the final product had high levels of grit and coagulum;
- f) that analysis of the final product with differential scanning calorimetry (DSC) showed that the polymer had a glass transition temperature of -27.4 °C and no ethylene crystallinity. There was no melting point transition and no heat of fusion evident for the entire DSC scan which ranged from -65 °C to +200 °C indicating the absence of crystallinity in the polymer. (A copy of the scan is attached hereto and it is appropriately identified); and,
- g) that this polymer too, as in Example 1 had a tacky surface when cast as a film at room temperature.

8. that a DSC scan for Example 8 as described in Applicants' specification (and appropriately identified) has been provided as a representative illustration of the differences in thermal properties of polymers having ethylene crystallinity, thermal melting point and

heat of fusion as described in the above-captioned application polymer vis-à-vis polymers of the type produced by Worrall, et al.

That all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.



John Rabasco

Title: Sr. Princ. Research Chemist

Date 7 February 2006

S_{m}^{2m} EA 11
 E_{p}^{01} 3-R1
 M_d 1 6000 g
 TG(105)-(65) 200

Example

1

f^f

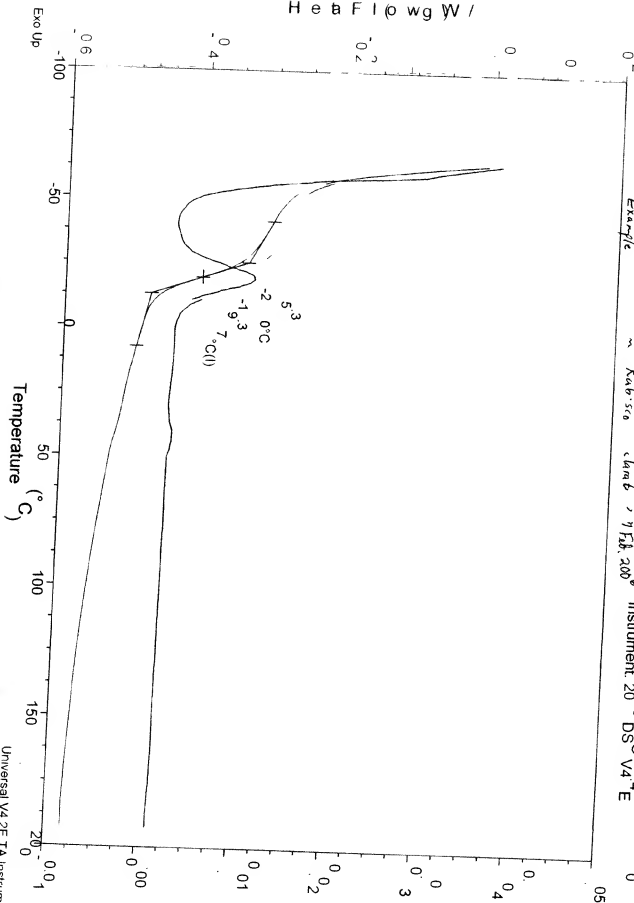
DSC

F_{p}^{1} A D X D S C 1 o x e g d 1 3 R 1 0
 O_{p}^{1} 5 1 1 a
 R_{n}^{1} 5 1 1 a
 Date: 0 10 200 1 2 2
 Instrument 20 DS V4 E

Example

R_{n}^{1} 5 1 1 a
 D_{c}^{1} 1 a m b 1 7 F L 2 0 0

Heat Flow (W/g)



Derivative (W/g)

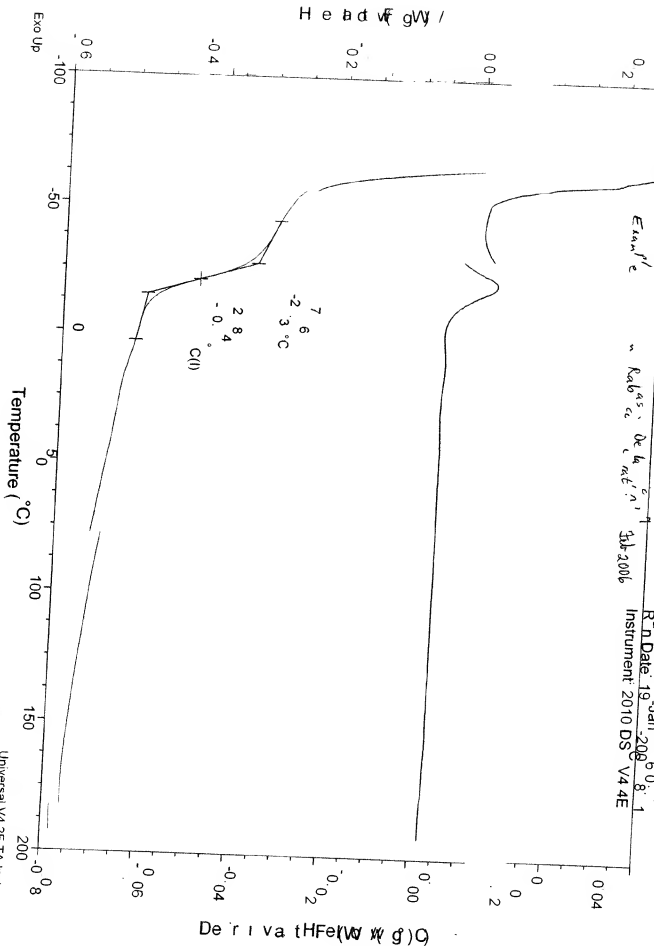
Sample: Se₂EA-1-R1
 Size: 7000 g
 Mod: IGC105(-55)(2)

2 f'

DSC

3/3/2006

File: \TA Data\XSC\eg
 Operator: J.C. XSC
 Run Date: 19-Jan-2006 6:08:11
 Instrument: 2010 DS V4.4E



Sample
 S. p. e. A-66¹
 M_e 10⁰R³
 T_m 100⁰(⁷⁰)(²⁰)
 Comment: ORION VAE J_R
 E_a

DSC

File D
 Operator D:\TA\0\EG\J 6 3
 Run Date 20-Sep-02 07:15
 #8 Fm Cas #06326 (10/6/201574)

